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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,863	03/19/2004	Shane Mayor	50139-00001	7656

25231 7590 07/11/2008
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EXAMINER

ALSOMIRI, ISAM A

ART UNIT	PAPER NUMBER
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3662

MAIL DATE	DELIVERY MODE
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07/11/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/804,863

Applicant(s)

MAYOR ET AL.

Examiner

Islam Alsomiri

Art Unit

3662

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20, 23 and 64 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20, 23, 64, 67 and 68 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Terminal Disclaimer

The terminal disclaimer filed on March 26, 2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on Application Number 11/291,505 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. **Claim 64 is rejected under 35 U.S.C. 102(b) as being anticipated by Segre et al. US 3,963,347.** Referring to claim 64, Segre discloses in figure 12 a lidar system (see abstract) comprising: a transmitter (94) for transmitting an optical beam having a primary wavelength between about 1.5 - 1.8 microns and having a first value of divergence (see col. 4 line 56); and a receiver (50 in figure 3) for receiving scattered radiation of said optical beam, said receiver having a second value of field of view defined by a detector surface and detector optics (see figures 3 and 12, col. 4 lines 34-39); wherein said second value field of view of said detector subsystem is at least about as great as said first value of divergence of said transmitter subsystem (see col. 4 lines 56-58); Segre teaches said optical beam has a pulse energy of about 100 m J/pulse

(col. 2 lines 54-57). Further, Segre's device inherently read on the claimed "range resolution of no more than about 50 meters" since the claim does not specify an exact resolution, S-to-N ratio, etc.); for example; depending on a given s/n ratio, Segre's resolution is no more than about 50 m.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. **Claims 1, 17-18, 67-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1.** Referring to claims 1 and 67-68, Segre discloses in figure 12 a lidar system (see abstract) comprising: a transmitter (94) for transmitting an optical beam having a primary wavelength between about 1.5 - 1.8 microns and having a first value of divergence (see col. 4 line 56); and a receiver (50 in figure 3) for receiving scattered radiation of said optical beam, said receiver having a second value of field of view defined by a detector surface and detector optics (see figures 3 and 12, col. 4 lines 34-39); wherein said second value field of view of said detector subsystem is at least about as great as said first value of divergence of said transmitter subsystem (see col. 4 lines 56-58); Segre teaches said optical beam has a pulse energy of about 100 m J/pulse (col. 2 lines 54-57). Segre is silent about having the pulse repetition frequency PRF of at

least 10 Hz. Guch teaches a similar system that uses an eye-safe laser at 1.57 micron and PRF in the one hundreds of Hz (see col. 4 line 3-7). It would have been obvious to modify Segre to use the transmitter of Guch that operates at 1.57 micron and 100 Hz PRF to achieve efficient laser pulses at high pulse rates.

2. Further, Segre's device inherently read on the claimed "range resolution of no more than about 50 meters" since the claim does not specify an exact resolution, S-to-N ratio, etc.); for example; depending on a given s/n ratio, Segre's resolution is no more than about 50 m.
3. Referring to claim 17, Segre teaches said transmitted optical beam and said received scattered radiation are substantially coaxial (see figure 12, the transmitted and reflected beams are indicated by arrows).
4. Referring to claim 18, Segre teaches said second value is .5 milliradians, and the first value is also .5 milliradians (see col. 4 lines 56-58), which reads on between about 1.0 and 1.5 times said first value.
5. **Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1 and Cheng et al US 20030016350A1.** Referring to claims 13-14, Segre teaches a collection optics (104 and 106) for collecting said backscattered radiation into a compressed beam, a detector (50) for converting incident radiation into an electrical signal representative of said incident radiation (see figures 3 and 9). Segre does not teach a focusing optics interposed between said collection optics and said detector for receiving said

compressed beam and directing said compressed beam onto an active detector surface of said detector. Cheng teaches a similar Lidar system including a receiver with a focusing optics (4) between the collection optics (6) and the detector (8) (see figure 1-3). It would have been obvious to include the focusing lens and the receiver of Cheng for a better and a more efficient receiver for detecting backscattered light returns.

6. Further, Segre discloses the collection optics (104 and 106) which makes up the claimed telescope. However, even if it does not form a telescope; Cheng teaches collection optics as a telescope (6) (see figure 1). It would have been obvious to modify Segre to include the telescope to collect all the scattered reflection from the desired target and direction accurately.

7. Referring to claim 15, the combination of Segre and Cheng teaches said receiver further comprises a collimator (Lens between 5 and 7 in figure 1 of Cheng) disposed between said collection optics (6) and said focusing optics (4) for collimating said compressed beam and a filter (7), disposed between said collimator and said focusing optics, for filtering said compressed beam on a wavelength dependent basis. It would have been obvious to include the receiver of Cheng for a better and a more efficient receiver for detecting backscattered light returns and reducing unwanted signals.

8. **Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1 and Cheng et al US 20030016350A1 and Kurnit et al "Generation of 1.54um Radiation with Application to an Eye-Safe Laser Lidar".** The combination of Segre and Cheng do

not teach the detector comprises an InGaAs conversion medium. Kurnit teaches a similar system which uses an InGaAs detector instead of avalanche photodetector (see page 610 lines 11-13). It would have been obvious to modify the combination of Segre and Cheng to use the InGaAs detector for its better signal to noise ratio.

9. **Claims 2-3, 8-9 11-12, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1 and Kurnit et al “*Generation of 1.54um Radiation with Application to an Eye-Safe Laser Lidar*”.** Referring to claim 2, Segre does not teach said transmitter comprises a laser pump for providing a source beam having a source wavelength different than said first wavelength and a wavelength shifter for shifting said source beam from said source wavelength to said first wavelength. Kurnit teaches a source beam having a source wavelength (YAG wavelength) different than said first wavelength 1.54 micron and a wavelength shifter (Raman cell) for shifting said source beam from said source wavelength to said first wavelength (see figure 1). It would have been obvious to modify Segre to replace the 1.54 micron laser with the laser of Kurnit in figure 4 to obtain the same 1.54 micron beam with more power.
10. Referring to claim 3, the combination of Segre and Kurnit teaches said wavelength shifter comprises a Raman wavelength shifter (see Abstract Kurnit).
11. Referring to claim 8, the combination of Segre and Kurnit teaches said transmitter further comprises a beam compressor (Beam reducer-figure 1 in Kurnit) disposed between said laser pump and said Raman wavelength shifter for compressing

said source beam from a first width to a second width less than said first width (inherent in a BEAM REDUCER) substantially free from focusing in relation to said Raman wavelength shifter (see figure 1 in Kurnit).

12. Referring to claim 9, the combination of Segre and Kurnit teaches the transmitter further comprises a gas circulation system for circulating a gas relative to a housing of said Raman wavelength shifter (see Kurnit page 16-18).

13. Referring to claim 11, the combination of Segre and Kurnit teaches said transmitter further comprises a beam expander (see figure 1 in Kurnit) for receiving said optical beam from said Raman wavelength shifter and expanding said beam from a first beamwidth to a second beamwidth greater than said first beamwidth (inherent in a beam expander).

14. Referring to claim 12, the combination of Segre and Kurnit teaches said transmitter further comprises a filter (Kurnit page 609 lines 20-21) for receiving an output beam from said Raman wavelength shifter and removing a component therefrom associated with said source wavelength (see figure 1 in Kurnit, the source beam is goes in the Beam dump which is filtered by the Dichroic crystal or lens).

15. Referring to claim 23, the combination of Segre and Kurnit are silent about said receiver comprises a processor for generating an atmospheric aerosol image based on data acquired in less than 1 second by said detector. However, using a very fast receiver and processor would have been very well known to use. It would have been obvious to modify Segre and Kurnit to use the best and fastest receiver and processor to generate the aerosol image in less than 1 second. Further, having receivers and

processors at the time of the invention that produces data in a fraction of a second were very well known.

16. **Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1 and Kurnit et al “*Generation of 1.54um Radiation with Application to an Eye-Safe Laser Lidar*” and Shoshan et al US 5,058,117.**

17. The combination of Segre and Kurnit do not teach said Raman wavelength shifter includes at least one internal reflectance element for redirecting said beam within a housing of said Raman wavelength shifter substantially free from surface reflection. Shoshan discloses in figure 2 a Raman converter or shifter 11, including one internal reflectance element (58) for redirecting said beam within a housing of the Raman shifter 11 (see col. 2 lines 15-17, and 57-61). It would have been obvious to modify the combination of Segre and Kurnit to include the internal reflectance element (prism 58) instead of reflecting mirrors to reduce the beam loss. Further, Shoshan does not mention that the Raman shifter 11 includes a housing. However, it is inherent that label 11 in figure 2 is a housing, because it is very necessary to block ambient light. Further, even if label 11 in figure 2 is not a housing. It is very well known and would have been obvious to include a housing that cover the Raman shifter 11 to reduce noises from ambient light.

18. **Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1 and Kurnit et al “*Generation of 1.54um Radiation with Application to an Eye-Safe Laser Lidar*” and Begley et al US 4,095,121.**
19. The combination of Segre and Kurnit do not teach said Raman wavelength shifter comprises at least one optical element disposed at a Brewster angle with respect to said beam. Begley teaches a Raman shifter with windows (16 and 22) at a Brewster angle (see figure 3). It would have been obvious to modify the combination of Segre and Kurnit to include the windows in the Raman shifter at a Brewster angle to get total transmittance or reduce cost by eliminating anti-reflection coatings.
20. **Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1 and Kurnit et al “*Generation of 1.54um Radiation with Application to an Eye-Safe Laser Lidar*” and Cardimona US 4,858,238.**
21. Referring to claim 6, the combination of Segre and Kurnit do not teach a seed laser for providing a seed beam for transmission to said Raman wavelength shifter together with said source beam. Cardimona teaches a seed laser (100) for transmission to a Raman shifter (180) together with a source beam (110). It would have been obvious to modify the above combination of Segre and Kurnit to include the seed laser to increase the efficiency of the Raman cell allowing more power output with a shorter cell length.

22. Referring to claim 7, it is inherent that the source beam and said seed beam have substantially equal beamwidths and are arranged for substantially coaxial transmission to said Raman wavelength Shifter for enhancing the Stokes radiations. Further, even if Cardimona does not teach the substantially equal beamwidths. It would have been very well known and obvious to modify the combination of Segre, Kurnit, and Cardimona to have the equal beamwidths to enhance the Stokes radiations.
23. **Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1 and Kurnit et al “*Generation of 1.54um Radiation with Application to an Eye-Safe Laser Lidar*” and Krapchev US 5414723A.**
24. Referring to claim 10, the combination of Segre and Kurnit do not teach said gas circulation system comprises a gas pump disposed outside of said housing. Krapchev teaches a similar system including the use of a pump (32) disposed outside of the housing to circulate the active medium (see col. 4 lines 58-59, figure 1). It would have been obvious to modify the combination of Segre and Kurnit to use the outside gas pump to circulate the active medium instead of the internal fan because it is easier to replace the outside pump then the internal fan.
25. **Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Segre et al. US 3,963,347 in view of Guch, Jr. et al US 6580732B1 and**

Schwartz Electro-Optics (SEO) "Final report on High energy, Eyesafe Lidar for Long-Range, High-Resolution Aerosol Detection".

26. Referring to claim 19, Segre is silent about including a scanner for scanning said optical beam relative to at least one scan axis. SEO teaches a similar system including a beam steering mirror to steer the beam toward the target (see page 82 2nd paragraph), which reads on the claimed "scanning said optical beam relative to at least one scan axis". It would have been obvious to modify Segre to include the beam steering mirror to illuminate the desired targets easily.
27. Referring to claim 20, the combination of Segre and SEO are silent about having a scanner to scan the optical beam relative to two axes. However, it would have been very well known to use a scanner that scans in two axes to direct the beam at targets in all directions.

Response to Arguments

Applicant's arguments filed August 30, 2007 have been fully considered but they are not persuasive. Regarding claims 1-20,23, 64, and 67-68, applicant argues that:

" Additionally, Segre does not disclose a receiver having a range resolution of no more than about 50 meters. The range resolution of a receiver may be dependent upon several factors that often involve design tradeoffs to suit a particular application. These factors include: pulse duration of the transmitted beam, response of the detector surface, the response of amplifiers, the digital

sampling rate, and other factors. It is therefore not surprising that Segre does not disclose a receiver having a range resolution of no more than about 50 meters as Segre is directed to a ceilometer, rather than a lidar system that may be used to detect aerosol plumes, which requires relatively higher levels of spatial resolution"

In response: applicant amended the independent claims to recite "a range resolution of no more than about 50 meters". This new limitation is written very broad, that even if Segre's system operates at higher levels of spatial resolution, Segre would still read on the new limitation; because the applicant did not specify the level of resolution, acceptable, precise, or an exact resolution ("no more than about 50 meters" is not an exact resolution unit). (Note: an exact resolution must be supported by the original specification).

Applicant further maintain the same arguments regarding the claimed "100 mJ/pulse". (see previous response below):

Regarding claims 1-20, 23, 64, 67-68, applicant argues that " Segre, which is not concerned with scanning for producing an image, does not disclose a suitable combination of wavelength, optical efficiency, pulse energy and pulse repetition frequency". In response Segre is clearly concerned with producing an image see col. 6:30-33 and col. 10:23-25. Applicant argues that Segre does not teach the claims 100 mJ/pulse, and explains that Segre only recites a "100 millijoules" in the background of the invention. In response, Segre talks about erbium laser in the background of the invention because it operates at 100 millijoules and is still safe; Segre also teaches

using this erbium laser (see claim 1 line 3), therefore, teaches the claimed 100 mJ/pulse. Further, Segre in claim 1 monitors the outgoing laser pulse (a single pulse) (see col. 10:54-55); therefore it is clear that the 100 millijoules is referred to that pulse which at that power level would still be safe. Therefore the rejections are maintained.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "Segre ceilometer application does not involve imaging of aerosol plumes") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Isam Alsomiri whose telephone number is 571-272-6970. The examiner can normally be reached on Monday-Friday 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Art Unit: 3662

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

July 7, 2008

/Isam Alsomiri/
Primary Examiner, Art Unit 3662